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1968

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A REVIEW OF THE SPECIES OF *CREMATOGASTER*, SENSU STRICTO, IN NORTH AMERICA (HYMENOPTERA, FORMICIDAE) PART II. DESCRIPTIONS OF NEW SPECIES

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ABSTRACT

Fourteen new species of North American ants (Formicidae) in the subgenus *Crematogaster* (*Crematogaster*) are described and notes are given on the known biology and distribution. These are *Crematogaster manni* Buren, n. sp., *C. rifelna* Buren, n. sp., *C. hespera* Buren, n. sp., *C. browni* Buren, n. sp., *C. navajoa* Buren, n. sp., *C. marioni* Buren, n. sp., *C. isolata* Buren, n. sp., *C. patei* Buren, n. sp., *C. colei* Buren, n. sp., *C. rossi* Buren, n. sp., *C. nocturna* Buren, n. sp., *C. mutans* Buren, n. sp., *C. larreae* Buren, n. sp., and *C. opuntiae* Buren, n. sp. Keys for the separation of all species of *Crematogaster, sensu str.,* in North America north of Mexico are also given.

The described new species below are known to me from North America and are a part of a revision of the subgenus *Crematogaster, s. str.,* in this faunal area. Keys that may help in the identification of the workers of species occurring north of Mexico are also given. In order not to have a too unwieldly and lengthy key, the species have been split into two groups, those occuring east of the Rocky Mountains, and those occuring in the mountains or in the deserts or in other habitats in the west. Only two species, *C. cerasi* (Fitch) and *C. punctulata* Emery, have distributions extensive enough so that they have had to be included in both groups. The identification of these ants is not easy, and I have had to use pilosity characters extensively in the keys. These therefore will not work for rubbed, poorly preserved material. Three species, *C. manni,* n. sp., from Cuba, and *C. rossi,* n. sp. and *C. patei,* n. sp., from Mexico, known only from limited material, have not been keyed.

The present paper does not purport to be anything more than alpha taxonomy with the purpose of validating some of the names which have been known to me under manuscript names for many years. The many important considerations regarding the full taxonomic treatment and identity of all species now known to occur in North America, including Mexico, Guatemala, and the West Indies, are still not completed to my full satsfaction and must be relegated to Part III of this revision.

I would like to acknowledge the aid of Dr. William S. Creighton for this paper; he has graciously sent me numerous series from his own collecting in the southwest and in Mexico. Many of these series represent new species. Other acknowledgements have been given in Part I of this revision (1958.)

A. Key to species of *Crematogaster, s. str.,* found east of the Rocky Mountains, north of Mexico

1. Thoracic dorsum covered with distinct, strong, vermiculate rugae; a small, dark colored, arboreal species usually found only in cypress swamps; distribution possibly co-extensive with the bald cypress in southern U.S. (type specimens mislabeled as to locality, not found in California) .... *vermiculata* Emery.

Thoracic dorsum without vermiculate rugae, or if faintly present on front of pronotum and base of epinotum, then not found in this habitat 2

2. (1) Pronotum rugose on each side and with a median, smoother sulcus;

when seen from the front, the high, median mesonotal carina may be seen through this sulcus almost like a gun sight; a small, dark colored, arboreal species, found nesting in live-oaks and other trees along the southern Texas gulf coast and on into Mexico. .....*rifelna,* n. sp.

Pronotum without this configuration 3

3. (2) Epinotal spines very short and distinctly incurved; thoracic dorsum smooth to weakly punctate, a small arboreal species common throughout the southeastern states from Texas to the Carolinas. .....*ashmeadi* Mayr

Without this combination of characters 4

4. (3) Pubescence suberect on at least head and thorax; erect hairs slender and numerous on thorax and gaster 5

Pubescence appressed on head, thorax, and gaster; erect hairs either rather sparse on thorax and gaster or if numerous then somewhat bristle-like in appearance. 6

5. (4) Pubescence suberect on head and thorax only; thorax smooth or faintly punctate; nests in large variety of semi-arboreal situations in or near swamps, salt marshes, rivers, and streams; common throughout southeastern U. S., reaching Texas, Missouri, Indiana, and New Jersey .....*clara* Mayr

Pubescence suberect on gaster and legs as well as head and thorax; thorax usually with some distinct rugae; often nests in logs and fallen branches in marshy situations; confined to the east coast from New Jersey to Georgia .....*pilosa* Emery

6. (4) Epinotal spines very long and with heavy bases, inclosing a smoothly parabola-like curve when seen from above; base of epinotum usually smooth or only feebly sculptured; common in peninsular Florida and in coastal salt-grass marshes to the Carolinas and Alabama; often builds large carton nests. .....*atkinsoni* Wheeler

Epinotal spines of moderate length and not inclosing a smoothly parabola-like curve; base of epinotum usually distinctly sculptured; carton nests rarely or never constructed. 7

7. (6) Erect hairs on thorax confined to a clump of one to several, long, flexuous setae on each shoulder of the pronotum 8

Erect hairs on thorax numerous and evenly covering nearly the entire dorsum 9

8. (7) Sides of pronotum and dorsum of pro - and mesonotum smooth and shining; epinotal spines usually straight; small incipient colonies often in oak galls and twigs, large colonies in tree trunks and logs; common in central Texas, occurring also in Mexico, Oklahoma, and Louisiana; no authentic records known east of Mississippi River .....*laeviuscula* Mayr

Sides of pronotum usually distinctly punctate and thoracic dorsum striate; epinotal spines often sinuate; nests under rocks and logs; sometimes doing appreciable injury to woodwork and timbers in houses; common in northeastern states and southern Canada, reaching Georgia through the Appalachians, Arkansas in the Ozarks, and west through the north central states and south to New Mexico in the Rockies. .....*cerasi* (Fitch)

9. (8) Thoracic dorsum punctate; erect hairs usually of approximately equal length on all parts of thorax; nests in the ground and tends root aphids and coccids; abundant in southern Great Plains area, less numerous but well distributed through the southeastern states, and south into Mexico, and west to Arizona. .....*punctulata* Emery

Thoracic dorsum rugose or striate; erect hairs very short on mesonotum; nests under rocks and logs; common in northeastern states and southern Canada, reaching south through all of the eastern states to the southern tier, and west to the Great Plains. .....*lineolata* (Say)

B. *Crematogaster, s. str.,* species of western U.S.

1. Anterio-ventral tooth of petiole strikingly large; pubescence very long, appressed, and silky in appearance on all surfaces; postpetiole trapezoidal, wider in front, and with straight sides; Nevada, and mountain-regions of California and probably Baja California at moderate altitudes; only North American species definitely suspected of being parasitic because of small female with compressed thorax, depressed gaster, and long, silky, appressed, yellowish pubescence. .....*mutans* n. sp.

Without this combination of characters; anterio-ventral tooth of petiole usually normal in size or absent; postpetiole usually with convex sides, or if straight, wider behind than in front; females with normally developed thorax and gaster. 2

2. (1) Erect hairs numerous on most of the dorsal surfaces of thorax and gaster; thorax punctate 3

Erect hairs in various confined patterns on thorax and gaster but not numerous on entire dorsal surfaces; if the thorax is punctate, then erect hairs usually sparse or absent on thorax 4

3. (2) Pubescence long and suberect on head and thorax; thoracic puncturation fine, the surface subshining to subopaque; northern Arizona and New Mexico at moderate elevations under rocks and at bases of various plants .....*navajoa,* n. sp.

Pubescence appressed and rather short on all surfaces; puncturation of thorax strong, the surface subopaque to opaque; (habitat and distribution given in key A) .....*punctulata* Emery

4. (3) Declivity of epinotum and entire head strongly punctate; erect hairs numerous on gaster; western Mexico and southern Arizona in a number of habitats. .....*dentinodis* Forel

Without this combination of characters 5

5. (4) Meso-epinotal impression deep but narrow; epinotum with long base, convex at sides when seen from above, the bases of the spines not inserted at the widest portion; arboreal in oaks in the mountain ranges of southern Arizona, New Mexico, and west Texas, and probably in northern Mexico. .....*isolata* n. sp.

Without this combination of characters; the spines arising from the widest portion of the epinotum. 6

6. (5) Thorax densely punctate; erect hairs of thorax restricted to a single hair on each pronotal shoulder or else entirely absent. 7

Thorax either with some other type of sculpture or else two or more erect hairs present on each pronotal shoulder. 12

7. (6) Thorax devoid of erect hairs 8

An erect hair present on each pronotal shoulder 9

8. (7) Head and thorax reddish in color; nests in and among roots and lower stems of various plants throughout the deserts and semi-desert regions of the southwest and northern Mexico .....*depilis* Wheeler

Head and thorax black or dark brown; restricted entirely as far as known to nesting in lower stems and among roots of the desert plant *Larrea*

divaricata, the creosote bush, range probably co-extensive with that plant in Chihuahuan and Sonoran deserts both in the U. S. and in Mexico ....*larreae* n. sp.

9. (7) Scapes longer than head length, thickest portion of scapes a little before the apex, the apex slightly more slender; hemilobes of postpetiole rather sharply angulate behind in profile; mountains of New Mexico, Arizona, and west Texas under rocks at about 5,000 to 7,500 feet altitudes. .....*colei,* n. sp.

Scapes usually shorter than head length and with apices the thickest portion; postpetiole usually not sharply angulate in profile behind 10

10. (9) Pubescent hairs suberect on scapes and head, rather long on body; apparently restricted to southern California and Baja California, found at bases and on roots of various plants cultivating aphids and coccids. ....*californica* Emery

Pubescent hairs appressed on scapes and head and shorter and less noticeable on all surfaces, occuring only to the east of the Mojave and Colorado deserts. 11

11. (10) Thorax opaque with strong puncturing on all surfaces except the epinotal declivity, may be found principally at bases and foraging on *Opuntia fulgida,* the chain fruit cholla cactus, and at bases of various other plants in the Sonoran desert of southern Arizona and surrounding semi-desert. .....*opuntiae,* n. sp.

Thorax subshining, the puncturing very shallow except on lower mesopleura; imperfectly known from northern Arizona and southern Utah. ..... *nocturna,* n. sp.

12. (6) Distinct striae present on lower mesopleura. 13

Lower mesopleura without striae. 15

13. (12) Scapes not or scarcely surpassing hind corners of head in larger specimens, without noticeable mesonotal declivity, thorax weakly punctate; a rather small, arboreal species restricted as far as known to manzanita and live oaks in California. .....*marioni* n. sp.

Scapes surpassing hind corners of head by one or two diameters; mesonotal declivity abrupt and angular; larger, ground inhabiting species. 14

14. (13) Head entirely striato-punctate; hills and mountains of California coastal area with one record from Nevada, suspected of now possibly being a rather rare species due to displacement by the Argentine ant. ....*coarctata* Mayr

Head smooth and shining behind the eyes or with weak striae there only, under rocks in desert regions of Idaho, Utah, Nevada, and hills and mountains of California and Baja California. .....*mormonum* Emery

15. (12) Head and thorax reddish; thorax shining but with fine distinct longitudinal striae; without distinct declivity at rear of mesonotum; usually arboreal in cottonwood trees along rivers and streams throughout west from Chihuahua and west Texas to California .....*hespera,* n. sp.

Without this combination of characters 16

16. (15) Thoracic hairs short and straight, in a clump of 4 to 6 or more on each pronotal shoulder plus one or two pairs at rear of mesonotum; often constructs carton structures under rocks; mountains of Colorado, Utah, Arizona, New Mexico, western Texas, and northern Mexico. ....*emeryana* Creighton

Thoracic hairs long and flexuous, confined to one to three hairs on each pronotal shoulder, rest of thorax devoid of hairs. 17

17. (16) Spines very short, straight, or slightly to moderately incurved; petiole narrow, scarcely wider than the postpetiole; mountains of west Texas, southern New Mexico, and southern Arizona at altitudes usually over 5,000 ft., suspected of being widely distributed also in mountains of Chihuahua and Sonora, Mexico. .....*browni*, n. sp.

Spines divergent, sinuate, sometimes with outwardly curved tips; petiole broadly trapezoidal; occurs in northern New Mexico and rest of range as given in key A, but probably never sympatric with the preceding species. .....*cerasi* (Fitch)

Crematogaster manni n. sp.

Worker

Length about 2.5 mm.

Head, excluding mandibles, broader than long, with sides convex and posterior border excised slightly or straight in the middle, head a little broader in front of the eyes than behind. Scapes surpassing hind corners by about two diameters, the antennae noticeably large and heavy in proportion to the head. Humeri of pronotum strong, often marked by striae. Promesonotum convex in profile, especially in front, but much less so than in *sanguinea* and its close relatives. No mesonotal declivity. Meso-epinotal impression moderate. Epinotum very wide and with wide interspinal distance. Spines of the *ashmeadi* shape, subparallel or parallel and with convex outer sides, usually moderate in length, however, not short as in *ashmeadi*. Petiole with somewhat rounded sides seen from above, in profile thicker at rear than in front as in *sanguinea*. Hemilobes of postpetiole wide, rounded; sulcus of moderate depth. Postpetiole inserted a little farther back on dorsum of gaster than is usual in most species.

Clypeus merely roughened in the middle, laterally with converging striae. Genae and front striato-punctate, the genal sculpture carried well past the eyes. Vertex, occiput, and corners smooth and shining. Mandibles also weakly striate and shining. Front of pronotum punctate and irregularly roughened. Pronotal dorsum with faint striae or weakly striato-punctate, subopaque. Pronotal sides faintly striato-punctate, subshining. Mesonotum finely striate or striato-punctate. Mesopleura punctate. Metapleura shining above, striato-punctate below. Base of epinotum with faint irrregular rugae, declivity smooth and shining.

Pubescence short and appressed on all parts except scapes, there rather long and suberect. Erect hairs long on thorax, only one or two on each shoulder and one or two at rear of mesonotum. On gaster a few near posterior borders of the segments.

Head and thorax dark brown. Gaster black.

Type locality: Herradura, Cuba.

Holotype worker and fourteen paratype workers from Herradura, Cuba—W. M. Mann, collector. Holotype and most of the paratypes to be returned to the National Museum. I will retain three paratypes.

C. manni may be considered as something of a link between *sanguinea* and *ashmeadi*, but may be easily distinguished from either. The heavy antennae, wide epinotum, and shape of petiole show it to be related to *sanguinea*, but

manni differs in having a more flattened promesonotal dorsum with strong humeri, and the *ashmeadi*-type epinotal spines. The long antennae and stronger sculpture of the thorax as well as other differences separate it from *ashmeadi*. The pro-mesonotal outline of *ashmeadi* is more flattened, the humeri not as developed, and there is a definite mesonotal declivity, unlike ~~new~~ this new species.

This species is named in honor of its collector, the late distinguished scientist, Dr. William M. Mann.

C. rifelna n. sp.

Worker

Length about 3 to 3.6 mm.

Head, excluding mandibles, a little broader than long, with convex sides and posterior border straight or slightly excised in the middle. Scapes not reaching posterior corners in largest workers, barely surpassing them in small specimens. Humeri of pronotum strong and marked by rugae. Mesonotal carina strong and sharp, especially in front. Anterior to this carina on the pronotum is a distinct, rather smooth, median impression. Thus when the pronotum is viewed in front, the sharp mesonotal carina may be seen through this impression almost like a gun sight. Promesonotum somewhat flattened above in profile. Mesonotal declivity present but strongly angled. Epinotal spines straight, short, a little shorter than interbasal distance, parallel or feebly diverging, directed somewhat upward as well as backward, often with a little impression on base of epinotum just before base of each spine. Petiole with rounded sides seen from above. Hemilobes of postpetiole broad and rounded.

Genal striae very fine and closely set but distinctly etched and carried well past the eyes. Front and all of the rear of the head smooth and shining. Front and dorsum of pronotum irregularly rugose on the sides, finely striato-punctate toward the middle and the median impression usually shining. Sides of pronotum finely striato-punctate, smooth in the oblique impressions. Mesonotum finely striato-punctate. Mesopleura punctate. Metapleura mostly punctate below, striate above. Base of epinotum with strong, straight longitudinal striae, declivity smooth and shining. Postpetiole with faint, fine punctures.

Pubescence rather long, appressed on all parts but scapes, there suberect. Erect hairs not fine, several present on shoulders of pronotum and a few also at rear of mesonotum; on gaster confined mostly to the usual rows near posterior borders of the segments.

Concolorously black.

Female

Length about 7 mm.

Head, excluding mandibles, broader than long, somewhat broader behind than in front, with convex sides and straight or slightly excised posterior border. Scapes far short of reaching hind corners, reaching only to about level of lateral ocelli. Ocelli small. Head much broader than thorax. Mesoscutum a little longer than broad. Scutellum wider than long. Epinotal spines very short, less in length than diameter of their bases. Postpetiole with distinct if feeble impression for its entire length; without spiracular angles.

Clypeus distinctly convex in the middle, all densely striate; no median shining streak. Genae very densely striate (7 striae per 0.1 mm.), this sculpture carried well past the eyes. Rest of head smooth and shining. Pronotum finely punctate, smooth only at rear. Mesosternal sides striato-punctate, mesopleura with a few striae or smooth and shining. Metapleura striate and with fine intercalated punctures. Sides of epinotum striate. Base of epinotum with long longitudinal striae and rugae. Sides of petiole finely punctate. Postpetiole smooth and shining above.

Pubescence short and appressed on all parts. Erect hairs rather sparse on all parts.

Concolorously black. Wing veins and stigma brown.

Male

Length about 3 mm.

Basal funicular joints slightly broader than long. Head rather elongate and with very convex posterior border. Ocelli small, the vertex at rear border of head. Thorax a little broader than head. Mesoscutum a little broader than long. Scutellum without trace of lateral impressions, shaped, therefore, as in the female.

Head weakly punctate, shining. Mesoscutum finely striate, shining only on front of parapsides. Pronotum shagreened, subshining, smooth at rear. Mesosternal sides weakly striato-punctate, mesopleura striate in an oblique streak. Metapleura weakly striato-punctate. Sides of epinotum shallowly punctate. Base of epinotum smooth and shining.

Pubescent hairs short, suberect on head and thorax, appressed on gaster. Only a few erect hairs present.

Concolorously black. Wing veins very pale yellow.

Type locality: Riviera, Texas.

Holotype worker, 45 paratype workers, ten paratype females, and four paratype males from a few miles south of Riviera, Texas — W. F. Buren, collector. Included in the paratype series also are numerous workers, females, and males from several series from Victoria, Barroso, Riviera, Harlingen, and Brownsville, Texas. Also seen were a series collected at Victoria, Texas by J. D. Mitchell, a series in the collection of the Museum of Comparative Zoology from Mirador, Mexico, nesting in *Tillansia streptophylla,* and specimens from Gambel Creek, Tex. and Valles, S. L. Potosi, and Ciudad Victoria, Tamaulipas, Mex. — Wm. S. Creighton, collector.

C. rifelna is very distinct from other North American species in the possession of the median impression on the pronotum. In appearance and its arboreal habits it resembles *ashmeadi,* but such resemblances are probably due to convergence rather than any close relationship. The male of *rifelna,* as in *californica,* lacks the lateral impressions on the scutellum, an important and constant character throughout the *lineolata-laeviuscula* and *sanguinea-ashmeadi* groups. This character alone, without the pronotal impression of the worker, would serve to separate *rifelna* from these groups.

I found this new species in old cynipid oak galls and in twigs and small branches of oaks and various trees in the several localities from Victoria to Brownsville, Texas. Colonies with winged females and males were found September 23 and 24, 1942.

The name is derived from the old low German "rifeln" — to furrow.

Since numerous type specimens are at hand, they will be distributed

among the various museums so as to be of readily available reference use. The holotype and a number of paratypes will be deposited in the National Museum. Other paratypes will go to the Museum of Comparative Zoology, American Museum of Natural History, and California Academy of Sciences.

C. hespera, n. sp.

Worker

Length about 3 to 4.5 mm.

Head, excluding mandibles, broader than long, with convex sides and straight or slightly excised posterior border. Scapes surpassing hind corners by about one diameter. Humeri of pronotum not very evident. Thorax slender. Pro-mesonotum in profile evenly but not strongly convex; without mesonotal declivity. Meso-epinotal impression weaker than in many species. Base of epinotum in profile often convex and cut off from the bases of the spines by oblique impressions. Spines slender, sharp, not very divergent and often incurved at the tips, directed somewhat upward also. Postpetiolar hemilobes longer than broad, with some tendency to be semiangulate behind; spiracular corners not accentuated.

Genal striae not carried past the eyes or only to the middle of the eyes. Head shining on front, vertex, occiput, and corners, sometimes faintly punctate on vertex. Front of pronotum finely rugose. Dorsum of promesonotum longitudinally striate. Base of epinotum also longitudinally striate, the striae often carried right through the mesoepinotal impression from the mesonotum. Striae of epinotum not carried onto the spines but interrupted at bases by the oblique impressions. Pronotal sides finely striate. All the above sclerites shining even though striate. Mesopleura punctate. Metapleura striate or striate with fine punctures. Postpetiole finely punctate.

Pubescence short and appressed on all parts. Erect hairs slender, only a few on pronotal shoulders and at rear of mesonotum. On the gaster mostly confined to the single rows near the posterior borders of each segment.

Head and thorax yellowish red. Gaster black.

Female

Length about 7 mm.

Head, excluding mandibles, much broader than long, the posterior border excised, and sides a little convex. Scapes reaching slightly past corners. Basal funicular joints about as broad as long. Ocelli small. Head much broader than thorax. Mesoscutum a little longer than broad. Scutellum distinctly wider than long, with weak anterio-lateral impressions. Epinotal spines short, little or no longer than diameter of bases. Base of epinotum with median impression. Spiracular angles of postpetiole not strong, somewhat rounded. Tarsal joints slender, hind fourth tarsal joints not bilobed seen from above. Epinotal lateral convexities usually moderate, sometimes strong, but evenly convex in either case, never tuberculate.

Mandibles striate, with smooth sulcus at base. Clypeus with wide median shining streak, rest striate. Frontal furrow weak. Genal striae not carried past the eyes. Rest of head smooth and shining. Front of pronotum finely roughened and striate, smooth on middle and rear. Mesosternal sides strongly striate: mesopleura smooth. Metapleura striate. Sides of epinotum faintly striate or nearly smooth. Base of epinotum with faint rugae directed toward the spines. Sides of petiole usually only finely punctate. Postpetiole smooth above.

Pubescent hairs short on all parts, subappressed on head and thorax, appressed on gaster. Erect hairs rather sparse.

Head and thorax yellowish red, with three elongate infuscated spots on mesoscutum along the anterio-median and parapsidal sutures. Gaster reddish black or black. Wing veins and stigma pale yellow.

Type locality: Phoenix, Arizona

Types: Holotype worker and eleven paratype workers from Phoenix, Arizona, July 20, 1918 — A. W. Morrill, with the note "attacking unripe peaches, very destructive." I have another series from Phoenix of ten paratype workers and three females collected Dec. 25, 1895. The latter series was seen by Emery and marked by him as transitional from *laeviuscula* to *cerasi*. I have marked as paratypes also numerous specimens from these localities: Big Dalton Canyon, Glendora, Calif. — A. Mallis and J. Schwartz; Col. Desert, Calif. — A. L. Pickens; Glenville, Calif. — A. Wetmore; Pacific Grove, Calif. — W. M. Mann; Sacaton, Ariz. — F. S. Strickney; Nogales, Ruby, and Patagonia, Ariz. — L. F. Byars; Las Cruces, N. Mex. — A. C. Cole; Nogales and Patagonia, Ariz., and Ysleta and El Paso, Tex. — W. F. Buren; Sacramento, Calif. — P. H. Arnaud; Santa Ysabel and Mt. Laguna, San Diego Co., Calif.; Ft. Huachuca, Wickenberg, and Patagonia, Ariz.; and Imuris, Sonora, Mex. — W. S. Creighton; and Tempe, Ariz., W. M. Wheeler. A few other paratype specimens are known from "Los Angeles Riv., Calif.," Ventura and Pasadena, Calif., Tucson, Ariz., and Zion Canyon, Utah.

Holotype and many of the above paratype specimens are to be returned to the National Museum. Other paratypes will be returned to the California Academy of Natural Sciences and to the private collections of Dr. A. C. Cole and Dr. Wm. S. Creighton. I will retain a few paratypes from some of the series and deposit some of the paratypes in the Museum of Comparative Zoology.

This form may be easily distinguished from *laeviuscula* by the finely striate thorax, the evenly but not strongly convex profile of the promesonotum without mesonotal declivity, the less divergent, often incurved epinotal spines wth the little oblique impressions at base, the differently shaped postpetiole and by the fact that the larger workers do not exhibit as much allometry as in *laeviuscula*. The females differ in having the genal striae not carried as far back as in *laeviuscula,* the scapes a little longer, and the sides of the epinotum less sculptured. The easiest way to distinguish the females of the two species is perhaps by the shape of the scutellum. This sclerite has weak anterio-lateral impressions in *hespera* so that the outline seen from above between scutellum and each posterior mesoscutal area is distinctly indented and the posterior mesoscutal areas are much more convex laterally than in most species. The females of *hespera* also seem somewhat smaller.

Because of the striate thorax, *hespera* might be mistaken for *cerasi,* but the latter always exhibits a distinct angular mesonotal declivity in the large specimens and the epinotal base and spines are dssimilar. The females of *hespera* and *cerasi* are somewhat similar but differ in color; the frontal furrow of *hespera* is weak as in *laeviuscula* rather than strong as in *cerasi;* and the tarsi of *hespera* are more slender, the hind fourth tarsal joints not bilobed seen from above. They are feebly bilobed in *cerasi.*

From my own observations on this species and from the data of other collectors, *hespera* seems largely arboreal. The favored habitat seems to be the large cottonwood trees growing along streams in the southwestern states and northern Mexico. It has also been found in various other trees and in rotten logs. Most of the records are from stations between 2000 to 5500 feet in altitude except the west coast finds.

The question of whether *hespera* is a good species or instead must be considered as a geographical subspecies of *laeviuscula* is difficult to decide at present in spite of what would seem to be sufficient sampling in the areas involved. *C. laeviuscula* appears to fade out in west Texas, whereas *hespera* appears west of the Chisos and Davis mountains in westernmost Texas and then occurs throughout the southwest and on into California. Perhaps more collecting in Mexico would settle the matter. *C. laeviuscula* is certainly numerous enough in Tamaulipas just east of the Sierre Madre Oriental, while the western slopes of these mountains and the central plateau where *hespera* might possibly occur have not been sufficiently collected. Probably the most likely area to sample to discover either the overlaping zone or the intergradation zone would be a thorough exploration of the Rio Grande River bottom lands from Del Rio to El Paso, Texas.

C. browni n. sp.

Worker

Length about 3 mm. or less, a few specimens up to 3.5 mm.

Head only slightly broader than long in most specimens, distinctly broader in largest specimens, with feebly convex sides and nearly straight or very slightly excised posterior border, slightly narrower behind the eyes than in front. Scapes surpassing hind corners by about one diameter in most specimens, only slightly surpassing in largest workers, evenly incrassated to tip. Promesonotum flattened above in profile, with short and gently sloping but distinct mesonotal declivity, this more abrupt in largest workers. Pronotal shoulders evident. Meso-epinotal impression shallow. Base of epinotum rather short; declivity with rather long, gentle slope. Spines very similar to *ashmeadi* in shape; short, subparallel, and convex on outer sides; a little more slender and longer than in that species, however, only a little shorter than interbasal distance. Petiole rather narrow, only very slightly wider than postpetiole. Hemilobes of postpetiole produced posterio-laterally a little, not with evenly convex sides as in many species. Proportions of femora and tarsal joints as in *cerasi* and *lineolata* rather than as in *ashmeadi.*

Mandibles finely striate. Clypeus finely and completely striate. Genae finely striate to about middle of eyes. Rest of head smooth and shining. Front of pronotum irregularly rugose. Dorsum of promesonotum longitudinally striate and also with fine, intercalated punctures. The striae are usually predominant on the pronotal dorsum but on the mesonotal dorsum these become very faint leaving the puncturation as the most obvious sculpture. Base of epinotum with fine striations and puncturing. Sides of pronotum with coarser but no deeper puncturing, subopaque to subshining. Mesopleura striato-punctate. Sides of epinotum very shallowly striato-punctate. Sides of epinotum very shallowly striato-punctate, subshining. Declivity of epinotum smooth and shining. Dorsum of postpetiole very finely striato-punctate, subopaque to opaque.

Erect hairs unusually long in proportion to the size of this species, arranged as follows: usually no more than one or two or at most three pairs on head, often none; on thorax usually one long flexuous hair on each shoulder, sometimes two but no more than three per shoulder; on petiole and postpetiole the usual posterio-dorsal pairs, the pair on postpetiole often unusually long and with a characteristic bend near base and then carried directly caudad; on dorsum of first gastric tergite a few scattered hairs and seven or eight hairs in posterior row; on remaining segments a similar number or less in single rows; on venter of gaster some very long hairs. Pubescence short and closely appressed on all surfaces.

More or less concolorously dark brown to black, sometimes thorax a little lighter.

Female

Length about 8.5 mm. to 9.0 mm.

A rather large and robust female, especially in comparison with the small worker.

Head rectangular, with straight hind border and straight or slightly convex sides. Scapes very nearly meeting hind corners of head. Mandibles usually with six teeth, occasionally with seven, thus contrasting with the mandibles of the females of most North American species which have only five. Eyes and ocelli of normal size. Thorax robust, mesoscutum about as broad as long. Post-scutal areas large. Epinotal spines long and robust, with small laterial convexities at bases. These are behind the spiracles.

Integument highly shining, even where sculptured. Genal striae rather coarse, usually not carried past the eyes. Frontal furrow distinctly impressed. Pronotum smooth on rear portion. Mesoscutum smooth but with several large, distinct, elongate piligerous foveolae near lateral edge just in front of wing insertions. Mesopleura with smaller but distinct piligerous foveolae on upper half or third. Lateral portions of mesosterum and metapleura with fine, distinct striae. Epinotum and sides of petiole striate. Metanotum apparently never produced into a definite point or process.

Erect hairs moderately abundant, present on all usual surfaces. Pubescence subappressed or appressed on all surfaces, rather long.

Concolorously black or dark brown.

Range: Occurs in the southwestern mountains mainly at approximately 4,500 to 6,500 ft. altitudes, and has been found most readily by overturning rocks. Several series are known from Garden Canyon, Huachuca Mts., Ariz. — Wm. S. Creighton, collector; I have marked as the holotype a worker from one of these series and this locality therefore becomes the type locality. I have also marked as paratypes numerous examples from Canelo Pass, Santa Cruz Co., Ariz. — Wm. S. Creighton; Brown Canyon, Baboquiveri Mts. — Creighton; Sierra de San Jose, S. of Naco, Sonora, Mex. — Creighton; Nogales Ranch, Sierra de en Medio, Chihuahua, Mex. — Creighton; several series from the Franklin Mts., El Paso, Tex. — W. F. Buren; Silver City, N. Mex. — Buren; several series from near McDonald Observatory, Davis Mts., Tex. — Buren. The late Dr. L. F. Byars found this species on a number of occasions. His records, which I have also marked as paratypes, are from Montezuma Pass and Sunnyside Road Fork, both in the Huachuca Mts., Ariz.; Calabasas Ridge, Tumacacori Mts., Ariz.; and Sycamore Canyon, near Ruby, Ariz. Dr. Wm. M. Wheeler was the first myrme-

cologist to capture this species. His records are from the Huachuca Mts., Ariz. in 1910 and from Oracle, Ariz. in 1919 and have been marked as paratypes.

The holotype and representative paratypes are to be deposited in the National Museum. Other paratypes are to be sent to the Museum of Comparative Zoology, American Museum of Natural History, California Academy of Natural Sciences, to Dr. Creighton's private collection, and to the Cornell University collection. I will retain a few paratypes from each of the series. This new species is named in honor of Dr. Willam L. Brown, Jr., whose stature as one of the world's leading myrmecological systematists continues to grow.

Although the epinotal spines are very short and often incurved in this species, as in *ashmeadi,* there seems little possibility that there could be more than a remote relationship. *C. ashmeadi* is strictly arboreal, has noticeably short legs, and the tarsal proportions are such that the third and fourth joints of the mid and hind tarsus are each only slightly shorter than the preceding joint. The legs in this new species are of normal length and the tarsal proportions are more differentiated as in most North American species. The females are quite different in numerous characteristics. Since there is least a 500 to 700 mi. gap between the ranges with very diffrent ecological situations, there should be no difficulty. About the only species occurring sympatricly with which *browni* is likely to be confused is *emeryana* Creighton, being very similar in size and general appearance and in nesting site preferences. However, the incurved spines, narrow petiole, and long flexuous hairs which have a different arrangement, should allow an easy separation.

My finding of *browni* on the tops of the Franklin Mts. in El Paso is worthy of note as it shows that this species is adaptable to a rather wide range of conditions. These mountains are treeless, and are entirely rocky and desert-like. *C. browni* was the only *Crematogaster* that I was able to find on these mountains above 5,500 to 6,000 ft. On the lower slopes at approximately 3,500 to 5,000 ft., the desert species, *C. depilis* Wheeler and *C. larreae,* n. sp. occur. This contrasts strongly with the conditions in the Davis Mts. of Texas, which at over 5,500 ft. elevations are covered by open forests of pinyon pine, juniper, and oak, and a good stand of grasses. Three ground inhabiting species occur there, *emeryana, browni,* and *colei,* n. sp., with probably *emeryana* being predominant. From the limited information available it would seem that while *emeryana* and *browni* occur together in some of the mountains of southwestern U.S., *emeryana* ranges considerably further northward than *browni,* while *browni* may be the only species able to colonize the tops of the barren mountains which occur throughout the Chihuahuan desert, and thus could be expected to have a considerably more extensive range in Mexico. Some ecologically challenging problems are perhaps suggested.

C. navajoa n. sp.

Worker

Length, about 3.5 to 4.0 mm., an occasional specimen up to 4.5 mm.

Head slightly broader than long in most specimens, in largest workers distinctly broader than long; sides of head convex, rear border usually

slightly concave. Cypeal border gently convex. Scapes rather variable in comparative length, this not always exactly correlated with head size, usually surpassing the hind corners by about two diameters, in largest workers scarcely surpassing the hind corners. Pronotal humeri only moderately developed throughout the size range, no oblique lateral pro-mesonotal impressions. Mesonotal median carina high and sharp on the front half or front two-thirds of the mesonotum. The height of this structure is especially noticeable in profile. Mesonotal declivity gently sloping in large workers, in small workers scarcely noticeable. Spines rather short, slender, and sharp, only weakly divergent, and often slightly convex on the outer sides seen from above, thus somewhat similar to the appearance in *browni*. Petiole of the usual trapezoidal shape, but this less strong than in most species, the anterior corners not strongly produced and the anterior borders, seen from above, sweeping obliquely caudad from the pedicel rather than being carried at right angles laterad. Postpetiole, however, very broad and well developed, very nearly as, or sometimes even slightly wider than the petiole; the hemilobes very well devloped and globose, very convex laterally, and separated by a deep median sulcus; in profile they are moderately produced posteriorly.

Head mostly smooth and shining, with some shagreening on vertex and occiput. Mandibles and genae with usual strong striae, middle of clypeus usually without them. Thorax entirely but very shallowly punctate, subopaque. There are some weak irregular rugae often on the front of the pronotum and the humeri, and some weak irregular striae often on base of epinotum. Sides of pronotum punctate. Lower mesopleura punctate and also often with some weak striae.

Head with very few long erect hairs on dorsal surfaces, but beset with long erect pubescence on all surfaces including the scapes. Thorax with a band of very long, flexuous, erect hairs across the front of the pronotum, and several more pairs of long, erect hairs on dorsum and rear of mesonotum. Petiole and postpetiole wth the usual posterior hair pairs long and flexuous and with some accessory hair pairs. Gaster with scattered long erect hairs. Pubescence on thorax and legs erect or suberect. Pubescence on dorsum of gaster long but entirely appressed.

Head, thorax, petiole, postpetiole, and appendages dark brown. Gaster black.

Female

Large robust females 9-10 mm. in length with large heavy gasters often 5 mm. long and 3 mm. wide.

Head a little broader than long, with weakly convex sides and rear border. Scapes usually not quite reaching hind corners in full face view. Frontal furrow weak and scarcely noticeable. Neither eyes nor ocelli large or prominent. Mesoscutum as wide as long. Scutellum much wider than long. Spines short but sharp, a little longer than diameters of their bases. Metanotum often produced medially into a blunt process. Petiole as in the worker, without strong anterior corners. Postpetiole unlike that of the worker, trapezoidal, with nearly straight sides and wider in front than behind as in the females of many species.

Head entirely smooth and shining except for a large number of piligerous punctures and the usual coarse striae on mandibles, genae, and sides of

front. Those on the genae carried slightly past the eyes. Median part of clypeus without striae. In lateral view, front half of pronotum strongly shagreened and roughened, posterior half smooth and shining. Mesopleura nearly entirely smooth and shining except for large piligerous punctures. Rear half of sides of mesosterum striato-punctate. Metapleura strongly striate. Base of epinotum irregularly striate or rugose. Sides of mesoscutum with some elongate piligerous foveolae as in *browni,* rest of dorsum of thorax with numerous piligerous punctures.

Head with moderately numerous, long, erect hairs on front but also beset with abundant long, flexuous pubescent hairs on all surfaces, including the scapes. These are especially noticeable in full face view on the genae in front of the eyes and on the rear border and corners of the head. Thoracic dorsal surfaces covered with very numerous erect hairs. The pubescent hairs are suberect on the thorax but are much shorter and less conspicuous than on the head. Dorsum of gaster with rather numerous erect hairs and moderately long suberect pubescent hairs. Legs with suberect to erect pubescence, long and flexuous only on the coxae and flexor surfaces.

Concolorously very dark brown to black. Radius vein to the stigma dark brown. Stigma and remaining veins light brown to colorless.

The type locality of this new species is 8 mi. E. of Seligman, Ariz., where I took numerous specimens under rocks on Aug. 11, 1957, and Aug. 16, 1958, in juniper-grassland. I have also captured this species near Rainbow Lodge in the Petrified Forest National Monument, Ariz. and the Painted Desert, Ariz., all specimens in these two localities captured at the bases and roots of sagebrush and other desert plants. No specimens could be found under the pieces of petrified wood or other rocks in these localties. I have chosen a worker from the Seligman locality to be the holotype and all the other specimens have been labeled as paratypes. Holotype and worker and female paratypes are to be deposited in the National Museum, and paratypes are to be deposited in the California Academy of Sciences, the Museum of Comparative Zoology and the American Museum of Natural History. I will retain a fairly large number of paratypes. Before me also are two specimens from Montano Grant, New Mexico, collected by P. Klngenberg in 1936. All the records taken so far are from the Colorado Plateau in northern Ariz. and northwestern New Mexico, which corresponds roughly with the original home range of the Navajo Indian Nation, hence the name. I should think this interesting new species could be found eventually in many places in perhaps the southern half of Utah, southwestern Colorado, and perhaps isolated spots in Nevada.

The workers of *navajoa* have a strong resemblance to *clara* Mayr, a species which has a much more hygrocolic habitat in the southeastern states and is partially arboreal. Since the known ranges are separated by approximately 700 to 800 miles or more, there should be no basis for confusion. The two species may be separated in the worker by the definitely, even though not strongly, entirely punctate thorax in *navajoa.* Other differences are that the erect hairs and the pubescent hairs are much longer in *navajoa* than in *clara* and that the base of the epinotum lacks vermiculate rugae in *navajoa* whereas these are nearly always present in *clara.*

There are only two other species in North America which at all resemble *navajoa.* These are *C. pilosa* Emery and *C. patei,* n. sp.; the former is

known only from the Eastern coastal plains in swampy areas, and the latter from the gulf coast of Mexico in an unknown habitat.

C. navajoa differs from *pilosa* by having the pubescence appressed on the gaster and legs, and by the punctate rather than striate or longitudinally rugose thorax, and from *patei* by its nearly entirely smooth and shining head and by having the pubescence on gaster and legs appressed.

C. marioni n. sp.

Worker

Length about 2.8 to 3.3 mm.

Head, excluding mandibles, a little longer than broad or as long as broad, with moderately convex sides and posterior border straight or nearly so. Scapes scarcely surpassing hind corners. Second funicular joints longer than broad but third to fifth, at least, broader than long. Shoulders of pronotum usually weak or inapparent. Pro-mesonotum in profile above evenly but weakly convex, without mesonotal declivity or this very short. Meso-epinotal impression, nevertheless, rather strong. Mesonotal carina evident in front only, moderate to strong and sharp. Epinotal spines of moderate length, shorter than interbase. Spines not slender, nearly always straight, divergent, and horizontal, not tilted upward. Base of epinotum long; in profile often somewhat convex and with small impressions just preceding the bases of the spines. Petiole little broader than long, no more than one and one-third broader in any specimen measured, and rather angulately trapezoidal; an anterio-ventral tooth present. Hemilobes of postpetiole rather elongate, more produced to the rear and semi-angulate there, straight sided, with faint spiracular angles. Gaster rather slender.

Head sculpturing rather weak. Genae striato-punctate to about middle of eyes, thereafter weakly punctate past the eyes. Head smooth and shining on venter and corners, subshining and faintly punctate on front, vertex, and middle of occiput. Front of pronotum with weak irregular rugae. Dorsum of pronotum rather weakly punctate and subopaque. Sides of pronotum very weakly punctate or striato-punctate, subshining. Mesonotal dorsum weakly punctate. Mesopleura punctate and with moderate rugae or striae. Metapleura punctate with faint striae below, striato-punctate above. Base of epinotum punctate with a few strong longitudinal striae; declivity shining, faintly punctate. Postpetiole punctate with striae on the dorsum. Gaster smooth and shining.

Pubescent hairs long and rather coarse, appressed or subappressed on most surfaces including scapes and legs, on petiole more erect, on gaster subappressed and a little curved or reflexed. Erect hairs weakly bristlelike, short; on thorax three to six hairs on each shoulder and two to four at rear of mesonotum. These apparently easily rubbed and lost, as many specimens lack them. On gaster numerous and scattered on first segment, in the usual rows on remaining segments. Postpetiole usually with accessory pairs besides the constant posteriodorsal pair.

Head dark brown, thorax somewhat lighter. Gaster dark brown.

Holotype worker and numerous paratypes from several nests in either dead manzanita stems or branches or on live oak at Morena Lake, San Diego Co., Calif., W. F. Buren. The species is also represented by numerous specimens collected by Dr. Wm. S. Creighton, which I have also marked as para-

types, from 13 mi. E. of Tecate, Baja California, Mex.; Dripping Springs Camp Ground, Aguatibia Mts., Calif. (3 colonies); Cameron Corners, San Diego Co., Calif.; and Canyon City, San Diego Co., Calif.; all these records from live oaks. I have also marked as paratypes a few specimens from Robertson Creek, Monterey, Calif., and have seen specimens from Santa Barbara, Pasadena, and San Ysidro, Calif. The holotype and a few paratype specimens are to be sent to the National Museum. Other paratypes will be sent to the Museum of Comparative Zoology, American Museum of Natural History, California Academy of Natural Sciences, and the personal collection of Dr. Creighton. I will retain paratypes from each series.

C. marioni is named in honor of one of our foremost myrmecologists, Dr. Marion R. Smith, now retired.

This species is apparently entirely arboreal, and possibly nests only in live oak and in manzanita, if available records are a sufficient sample. There is no other species in California or Baja California with which *marioni* is likely to be confused. It does seem close to *isolata,* n. sp., which will be described below, but is perfectly distinct, especially in pilosity, and there would seem no chance for confusion.

C. isolata n. sp.

Worker

Head, excluding mandibles, slightly broader than long, with convex sides and posterior border excised in the middle. Scapes surpassing posterior corners by about one diameter, less in larger workers. Humeri of pronotum absent or weak. Pro-mesonotum in profile evenly but not strongly convex above. Mesonotal declivity absent or short and rounded. Meso-epinotal impression a strong and deep groove above, deeper than in any preceding species. Mesonotal carina weak or absent. Base of epinotum long, noticeably longer than in most species. Spines short, one half of interbasal distance in length or even less, straight, divergent, not slender or sharp. Base of epinotum from above somewhat convex or tuberculate at sides. Petiole slightly broader than long, angularly trapezoidal. Hemilobes of postpetiole elongate, more produced behind, with slightly convex sides from above. Median impression fairly strong, especially behind, not groove-like but a fairly wide, evenly concave impression.

Genae striato-punctate to about middle of eyes. Head subshining on front, vertex, occiput, and corners, sometimes corners smooth and shining. Sides of venter striato-punctate. Vertex and middle of occiput punctate. Front faintly punctate. Front of pronotum punctate, and there may be a shining median streak. Pronotal dorsum punctate. Pronotal sides with larger but weaker punctures, subopaque. Mesonotum punctate, subopaque. Mesopleura densely punctate. Metapleura punctate above and below. Base of epinotum punctate with a few longitudinal rugae or striae. Declivity smooth and shining. Petiole and postpetiole punctate, subopaque. Gaster with reticulate shagreen, subshining.

Pubescence moderately or quite short on all parts, appressed; subappressed on scapes. Erect hairs rather bristle-like, very sparse, one or none each shoulder on thorax, and two to four at most each segment of gaster, thus much sparser than in *marioni.*

Head and thorax usually dark brown. Gaster black.

The holotype and a number of paratypes were collected a few miles north of McDonald Observatory, Davis Mts., Texas, from a dead oak limb, Oct. 14, 1959, W. F. Buren. I have also marked as paratypes numerous specimens from the following localities: Madera Canyon, Santa Rita Mts., Ariz., June 21, 1951, crawling on manzanita, Wm. S. Creighton; Garden Canyon, Huachuca Mts., 5800′, in dead oak stubs, Creighton (two records;) San Luis Pass, Animas Mts., N. Mex., 5400′, Sept. 28, 1951, in *Quercus emoryi,* Creighton, (two records;) Sweetwater, Santa Rita Mts., Ariz., July 2, 1951, in dead oak stub, Creighton; Canelo Pass, Santa Cruz Co., Aug. 28, 1951, in dead oak limb, Creighton; Chiricahua Nat. Mon., Ariz., Sept. 20, 1951, in *Quercus emoryi,* Creighton. I have also seen and marked as paratypes a small series of 10 workers from Limpia Canyon, Davis Mts., Texas, altitude 5500 ft., and a single specimen each from the Guadalupe Mts. and Huachuca Mts., Ariz., L. F. Byars.

The holotype and a few paratypes from each series will be deposited in the National Museum. Other paratypes will go to the Museum of Comparative Zoology, the California Academy of Sciences, to the private collection of Dr. Creighton, and to my own private collection.

This species is not closely related to any species occurring in the United States except *marioni,* which can be easly separated by its pilosity. Since their ranges appear completely allopatric, probably no confusion will arise. The distinctive epinotum of *isolata* (see description) will clearly distinguish this new species from all other species in the United States. *C. isolata* appears to be the only arboreal species of this subgenus other than *marioni* which nests in oaks (and perhaps also manzanita) at altitudes over 5000 ft. in the southwestern mountains. *C. hespera,* a quite different species, is largely confined to cottonwoods at lower altitudes.

C. patei n. sp.

Worker

Length about 3.5 mm.

Head, excluding mandibles, a little broader than long, with feebly convex sides and nearly straight posterior border giving a somewhat oblong appearance. Antennae slender; scapes surpassing hind corners of head by one or two diameters, and shaped as in *colei* and *mormonum,* the thickest part well before the apex. Humeri of pronotum apparent. Pro-mesonotum somewhat flattened in profile; mesonotal declivity absent or very short, not angulate. Mesonotal carina confined to front of mesonotum only, short but rather sharp and strong. Epinotal spines shining, very slender, divergent, of moderate length but less than interbase or thoracic least width. Petiole rather angularly trapezoidal, broader than long, an anterioventral tooth present. Hemilobes of postpetiole produced latero-posterially, the sulcus between a deep concave impression which becomes very wide posteriorly. In profile the overlap of the hemilobes is bluntly angulate.

Mandibles striate. Clypeus striate and with intercalated punctures. Genae densely punctate and with some rather widely spaced, faint striae, a few of which are carried past the eyes. Rest of dorsum of head densely punctate except short, narrow median streak on front. Venter of head nearly all punctate. Entire thorax, except declivity of epinotum and spines, densely punctate. Some faint, irregular rugae sometimes present on front of prono-

tum but otherwise with only the one type of sculpture. Petiole and postpetiole also densely punctate. Gaster with fine, weak puncturing, subshining..

Pubescent hairs long, numerous, and erect on all surfaces including scapes, legs, and gaster, and difficult to distinguish from the normally erect hairs, which they closely simulate in length and appearance. Of the normal erect hairs there appear to be several on the pronotum, a pair or two at rear of mesonotum, several accessory pairs on petiole and postpetiole and to be rather numerous and evenly scattered on the gaster. But the pubescent hairs are so similar that there could be as many interpretations as observers.

Dark brown, the head and gaster darker than the thorax. The gaster may have been black in life.

Type locality: Tampico, state of Tamaulipas, Mexico.

Holotype worker and three paratype workers labeled simply — Tampico, Mexico, Locke. These have been loaned from the collection of Dr. W. M. Mann in the National Museum and will be returned, except for a single paratype which I will retain.

This species is named in honor of the late Dr. V. S. L. Pate, whose kindly and helpful advice during my studies at Cornell University is gratefully remembered.

This is a very distinct species, clearly separable from all other related species by the erect and abundant pubescence. In this character it shows a striking resemblance to *pilosa* Emery, but the two species are not alike otherwise and belong in different species groups. The slender, sharp, and shining epinotal spines of *patei* also provide a good diagnostic character. Similar spines are possessed by *dentinodis* Forel but this species has a punctate epinotal declivity, as well as short, appressed pubescence and differently arranged pilosity.

C. colei n. sp.

? *C.* (*Acrocoelia*) *depilis* Creighton, Bull. Mus. Comp. Zool. Harv. Vol. 104, p. 209 (1950) (in part? — female?) *nec* Wheeler

Worker

Length 3 to 4 mm.

Head broader than long, with weakly convex sides, rounded posterior corners and nearly straight posterior border. Except in the very largest workers, the head is always somewhat narrowed behind the eyes. Scapes long and slender, as long as head length, and surpassing posterior corners by two diameters or more. The scapes are also not evenly incrassated to the tips as in many species, but are very gradually thickened to about five-sixths of their length from the insertions and then slightly tapered again to the apex. Funiculi also slender, and all funicular joints longer than broad. Thorax flattened above and with strong humeri as in *californica* and *depilis* in large workers. The smaller workers have the thorax more slender and are without noticeable humeri. Mesonotal carina usually reduced to a short, blunt ridge. Mesonotal declivity present but rather gently sloping. Spines slender, sharp, usually straight, moderately divergent, longer than interbasal distance, sometimes only a little shorter than thoracic least width. Petiole broad, dorsal face about twice as broad as long (This is proportionally wider than in *californica*); anterior corners of petiole somewhat rounded, seen from above. Hemilobes of postpetiole somewhat produced

posteriorly and always angulate behind when seen in profile.

Mandibles weakly striate. Clypeus completely and distinctly striate. Sides of forward part of frons striato-punctate, this fading out at about level of eyes. Genae striate with faint intercalated punctures, becoming striato-punctate at about the level of the eyes, and this carried past the eyes and fading out a short distance caudad of the eyes. All rest of head smooth and shining except in the very largest workers. Thorax with a predominately punctate sculpture, but this rather shallow so that many parts are subshining. Front of pronotum with very weak irrregular rugae. Base of epinotum with weak longitudinal rugae. The punctures are more shallow on dorsum of mesonotum and sides of pronotum so that these parts are more nearly shining, but one receives tiny reflections of light from all parts of the thorax, showing that all of the punctures have smooth bottoms. Metapleura striato-punctate. Declivity of epinotum smooth and shining. Petiole and postpetiole very faintly punctate.

Pubescence closely appressed on all surfaces, including legs and scapes. Erect hairs very few, only one on each shoulder of thorax or often entirely absent; a single pair each on petiole and postpetiole, sometimes the petiolar pair absent; in rows of four or five or less at posterior borders of each gastric tergite.

Concolorously black, occasionally the thorax a little lighter.

Female

Length 10 mm

Head rectangular, distinctly broader than long, with nearly straight sides, and slightly convex posterior border. Scapes surpassing hind corners by about one-half diameter. Frontal furrow rather weak. Ocelli not nearly as large as in *californica,* rather rounded and not much distorting the surface of the head, greatest diameters about one-tenth the length of the head. Head about the same width as thorax. Mesoscutum a little longer than broad. Scutellum much wider than long. Metanotum not produced. Spines about twice as long as diameters of bases. Sides of epinotum evenly and weakly convex seen from above. Petiole with rather strongly produced anterior corners. Hemilobes of postpetiole angularly produced behind in profile as in the worker.

Mandibles striate, with rather smooth, deep sulcus near base. Clypeus striate, with median shining area. Genae strongly striate, this sculpture carried past the eyes to the level of the lateral ocelli. Front, vertex, and occiput, smooth and shining. Pronotum weakly striato-punctate, subshining, becoming smooth and shining near posterior border. Mesopleura smooth and shining except dorsal anterior quarter, this somewhat roughened. Sides of mesosternum striate and with very faint intercalated punctures, the same sculpture present also on sides of epinotum and meta-epimera. Base of epinotum with irregular striae or rugae directed toward the spines. All the above thoracic surfaces at least subshining even though sculptured. Sides of petiole with strong striae. Postpetiole nearly smooth.

Erect hairs slender, moderately numerous on all parts. Pubescent hairs rather long, especially on the head, on venter of head very long and suberect or erect and undifferentiated there from the erect hairs, forming with them a dense brush of flexuous hairs. Pubescent hairs appressed on all other parts.

Concolorously dark brown.

Type locality: Wooten, Sacramento Mts., New Mexico.

Holotype worker and paratype workers and females from Wooten, New Mexico. They are labeled "Wooten, Sacramento Mts., N.M., 7500 ft., July 4, 1917, Wheeler." The holotype and several paratypes will be deposited in the National Museum and others will be sent to the Cornell Univ. collection. I also have seen a number of paratype workers from each of the following stations: Montezuma Pass, Huachuca Mts., Ariz. — 6600 feet, under stone in oak-pinyon forest. Cottonwood Cany. Pass, Guadalupe Mts., New Mexico — 5800 feet, under stone, oak-pinyon forest. Miller Cany., Pic. Gr., Huachuca Mts., Ariz. — 6000 feet, oak-pinyon forest. Ash Cany., Huachuca Mts., Ariz. — 6500 ft., under stone, oak-pinyon forest. All of these collected by Dr. L. F. Byars. Numerous paratypes are also known from the following localities, all of these collected by Dr. A. C. Cole, Jr., 14 mi. west of Horse Springs, N. Mex., 7,350 ft., nest under stone in semidesert bordering yellow pine. Embudo, N. Mex., 5,850 ft. semidesert grassland, running on soil. Galesto, N. Mex., 6,050 ft., semidesert shrub area, nest under stone (specimens mixed with *punctulata,* possibly some sort of mixed colony? — or two nests under the same stone?) Seven miles west of Magdalena, N. Mex., 6,850 ft., nest under stone, semidesert grassland. I have also captured this species on a number of occasions, and have marked specimens from these localities as paratypes; near McDonald Observatory, Davis Mts., Texas, under rocks; 15 mi. N. of Ruidosa, N. Mex. under rocks in open pasture; and near Luna, N. Mex., in pinyon pine, juniper, grassland. Paratypes also will be sent to the Museum of Comparative Zoology, American Museum of Natural History, California Academy of Natural Sciences, and to the private collection of Dr. A. C. Cole, Univ. of Tennessee. I will retain paratypes from as many of the series as possible.

This species is named in honor of the outstanding American myrmecologist, Dr. Arthur C. Cole, Jr.

This is a well defned species although it is without any especially distinctive features in the worker which allow it to be immediately recognized without a little study. The anguate appearance of the hemilobes behind in profile is characteristic but is also possessed in some degree by the related *opuntiae, californica,* and *depilis,* and also by the larger specimens of several other species. With a little study it may be separated from *californica* and *opuntiae* by the longer and somewhat differently shaped scapes, and the differently shaped head and petiole, and from *depilis* by the longer scapes, less flattened and more slender pro-mesonotum in the smaller workers, darker color, and the presence of thoracic hairs in at least some specimens. They also live in different habitats. The distinctive characters of the female show that it must be separate from both *californica* and *depilis.*

I believe the female of *colei* was mistakenly described by Creighton (1950) as the female of *depilis.*

From the data given me by Drs. Byars and Cole, which I have cited in a paragraph above, and from my own observations, it is apparent that this species may be found mainly under rocks in various grassland associations at elevations over 5000 feet. The related species *californica, opuntiae, depilis,* and *larreae* are all true desert species usually found below 5000 ft. in association with various desert plants. They can not ordinarily be found

beneath rocks although they may be seen there occasionally under certain circumstances, such as warm weather after winter rains, or after very heavy summer rains.

C. rossi n. sp.

Worker

Length about 3.5 to 4.3 mm.

Head, excluding mandibles, a little broader than long, subrectangular in appearance, the sides more straight sided than in many species; posterior border slightly excised. Scapes surpassing posterior corners by about one diameter. Humeri of pronotum evident. Pro-mesonotal dorsum flattened in profile. Mesonotal declivity short or scarcely developed. Mesonotal carina moderate to weak, present in front only. Spines slender, divergent, sharp, of moderate length but less than the interbasal distance, straight or somewhat curved outwardly. Petiole broader than long, sometimes very broad, usually with rather angulate corners and straight sides, trapezoidal. Hemilobes of postpetiole not rounded, produced to the rear and semi-angulate there, median sulcus not strong, spiracular angles weakly produced.

Genal striae carried a little past the eyes. Front and most of rear of head shining or subshining; venter of head smooth and shining; vertex and middle of occiput weakly punctate or shagreened, a short median carinula often present on occiput. Pronotal front and dorsum strongly vermiculate or reticulate rugose. Mesonotal dorsum punctate and with irregular rugae or striae. Pronotal sides punctate with some striae in front. Mesopleura densely punctate. Metapleura densely punctate and rugose. Base of epinotum with irregular longitudinal rugae and fine dense punctures. Declivity of epinotum shining, faintly punctate. Petiole and postpetiole punctate; postpetiole with tendency to have striae.

Pubescent hairs of moderate length, appressed on head, thorax, and gaster; on scapes subappressed to nearly erect. Erect hairs rather long and slender, sparse, on thorax only one or two on each shoulder; on gaster sometimes rather numerous and evenly scattered over first segment, in others less numerous, but always with the usual row near the posterior border of each segment. Postpetiole usually with accessory pairs of hairs.

Head and thorax yellowish or light brownish red, the head usually a little darker than the thorax.

Female

Length about 9 to 10 mm.

Head, excluding mandibles, broader than long, subsquare in appearance. Scapes reaching posterior corners or sometimes slightly surpassing them. Basal funicular joints about as broad as long. Ocelli large, smaller, however, than in *californica*, round to oval in shape. Eyes also large. Head slightly broader than thorax. Mesoscutum a little longer than broad. Scutellum very broad, sometimes well over one and one-half times as broad as long. Thorax more robust than in *californica*. Metanotum not produced into a point. Spines short, about equal to diameter of their bases. Postpetiole with quite strong spiracular angles. Gaster voluminous.

Mandibles striate, without smooth sulcus at base. Clypeus striate but with median shining streak. Genal striae coarse, carried past the eyes. Front, vertex, and occiput of head shining, nearly smooth. Hind corners of head

usually with some fine but distinct striae. Pronotum finely punctate and with some irregular striae, these becoming distinct and longitudinal on lower posterior quarter, shining a little at extreme rear. Mesosternal sides striato-punctate on rear half, the striae stronger and denser than in *californica;* mesopleura smooth and shining. Metapleura strongly striate. Sides of epinotum strongly striate. Base of epinotum irregularly and transversely rugose. Petiole with strong striae and fine punctures on sides. Postpetiole striate above.

Pubescent hairs rather short and subappressed on all parts. A few, scattered erect hairs also present on all parts. Both erect hairs and appressed or subappressed pubescence present on venter of head.

Probably always concolorously dark brown in life but many specimens available to me now faded to a reddish brown. Wing veins and stigma dark brown.

Type locality: San Jose del Cabo, Baja California, Mexico.

I have before me the holotype worker and nineteen paratype workers and four paratype females from San Jose del Cabo, Baja California, and three paratype workers from Tepic, State of Nayarit, Mexico. Most of these will be returned to the U. S. National Museum but a few will be retained in my collecton. I also have seen a series of females from Triunfo, Baja California, and a single worker from Triunfo, Michelbacker and Ross, collectors.

This species is named in honor of Dr. E. S. Ross of the California Academy of Natural Sciences.

This species seems most closely related to *californica* Emery but is easily distinguishable from that species in either worker or female, the worker by its coarsely reticulate or vermiculate rugose thorax and more shining head, and the female by longer scapes, smaller ocelli, broader thorax and very broad scutellum, and several details of sculpture. Many workers also have the erect hairs somewhat more numerous than in *californica.* It is unlikely to be confused with any other species except, perhaps, *vermiculata* Emery, with which, however, it has no real affinity. The type locality of *vermiculata* is recorded as Los Angeles, Calif. This is certainly in error but will undoubtedly cloud the identity of *vermiculata* for all time. I have examined types of *vermiculata* in the National Museum and they are, without shadow of a reasonable doubt, conspecific with the rather common small arboreal species which is restricted to cypress swamps throughout the southeastern states. Since the ecological habitat for this speces is restrictive, I see no possibility that *vermiculata* could have ever been captured in California and must consider the type series mislabeled. The ant which Dr. Creighton (1950) treated as *vermiculata* is *californica.*

C. nocturna n. sp.

Female

Length about 10 mm.

Head, excluding mandibles, subrectangular in appearance, slightly longer than broad, sides nearly straight, and posterior border excised. When seen in profile the head appears flattened above and below, and the frontal carinae are at an angle of only a few degrees from the axis of the head. Scapes very short, even shorter proportionally than in some specimens of *californica,*

reaching only a little past the eyes or to the lateral ocelli. Basal funicular joints about as broad as long. Eyes large. Ocelli very large, protruding, and oval; the first ocellus looking forward and the lateral ocelli to the sides. Frontal furrow strong. Head broader than thorax. Mesoscutum much longer than wide. Scutellum wider than long. Metanotum not produced into a blunt point, similar, therefore, to *californica*. Epinotal spines short, little longer than diameter of base. Postpetiole with rounded spiracular angles.

Mandibles striate, without smooth sulcus at base. Clypeus with median shining streak, otherwise striate. Genal striae strong, carried past the eyes to the level of the lateral ocelli. Rear part of head smooth and shining, or faintly striate or shagreened but shining. Pronotum finely punctate, no shining area. Mesosternal sides striato-punctate; mesopleura mostly shining, sometimes with oblique striate streak. Metapleura striato-punctate. Epinotal sides finely punctate and rugose. Base of epinotum with fine, irregular, transverse rugae. Sides of petiole with fine punctures and strong striae. Postpetiole mostly punctate, especially the sides.

Pubescent hairs short and appressed on all parts. Erect hairs very sparse, usually none on thorax, a few on head and gaster.

Head and thorax reddish brown. Gaster black. Wing veins and stigma dark brown.

Male

Length about 3.8 to 4 mm.

Basal funicular joints slightly broader than long. Ocelli very large, protruding, white in color, strongly turned on their sides as in *californica* but even larger than in that species, the diameters greater than distance between them. Eyes also very large, hemispherical, occupying most of the sides of the head so that the distance between eyes and insertions of mandibles is very short. Thorax not wider than head when the head width is measured including the eyes, otherwise distinctly wider. Mesoscutum longer than wide. Scutellum with evenly curved sides, no anterio-lateral impressions. Metanotum produced into a blunt point.

Head faintly punctate or with reticulate shagreen. Mesoscutum shining, with some faint puncturing and large piligerous punctures. Pronotum with weak, coarse puncturing. Mesosternal sides punctate; mesopleura punctate except for their front angles. Metapleura striatopunctate. Sides of epinotum punctate. Base of epinotum smooth or shagreened only.

Pubescent hairs short and appressed on all parts. Erect hairs very few, only the venter of gaster with usual number.

Head and gaster brown. Thorax yellowish brown. Wing veins and stigma brown.

Possible worker, (not found in association with winged forms.)

Length about 3.5 to 3.7 mm.

Head distinctly broader than long, with strongly convex sides, the occiput a little concave, and the clypeal border evenly and gently convex, little produced. Scapes intermediate in shape between that in *colei* and in *opuntiae* and *californica,* apically of about equal diameter for about one-sixth or one-seventh the total length; scapes surpassing hind corners of head about one diameter or a little less. Eyes rather large, mesal and posterior borders much more convex than lateral borders which are nearly straight; anterio-lateral corners almost angular.

Thorax rather slender seen from above, without obvious pronotal humeri, in profile rather flattened above as in other related species, and with mesonotal declivity gently sloping. Spines very short, straight, and somewhat divergent. Petiole of usual trapezoidal shape, but anterior corners not strongly produced, only a little broader than long. Median sulcus of the postpetiole shallow; hemilobes with rounded sides, in profile hemilobes not at all produced posteriorly so as to overhang the strigulatory surface, merely evenly and gently rounded above, thus contrasting with the condition in *colei.*

Head with usual parallel striae on mandibles, clypeus, and genae, those on the genae not as coarse as in most species and carried only to the front or to about the middle of the eye. Head shining, but there is usually some indistinct shagreening on the front and some very shallow but distinct puncturing on vertex and occiput and sometimes on the front. Thorax sub-shining, entirely punctate except for declivity of epinotum which is smooth, but the punctures very shallow except on lower mesopleura, this one sclerite giving an opaque effect. Base of epinotum with some rather indistnct longitudinal rugae as well as puncturing. Petiole shining, with very faint puncturation. Postpetiole shining, with faint shagreening only. Gaster shining, with shagreening only.

Very few or no erect hairs on dorsum of head; one rather short hair on each side of the pronotum; one pair of short hairs each on petiole and postpetiole; a very few erect hairs on the posterior border of each gastric tergite. Pubescent hairs of moderate length, appressed on all surfaces, including scapes and legs.

The colors in the six known specimens show a rather dark reddish brown on head, thorax, petiole, postpetiole, and basal two-thirds of first gastric segment, the remainder of the gaster black.

Type locality: Rainbow Lodge, Navajo Mts., Arizona.

Holotype male, two paratype males, and nine paratype females from Rainbow Lodge, Navajo Mts., Coconino Co., Arizona, July 14, 1933, altitude 6,500 feet — H. N. Hultgren, collector. Holotype and most of the paratypes to be returned to the California Academy of Natural Sciences. The six workers on which the description of the possible worker is based were captured at White Canyon, Nat. Bridges Mon., Utah, June 29, 1935, by C. T. Brues. I have not marked these as types, however.

This species is closely related to *californica* Emery, the female being very similar, but the male is so distinct that there can be no question of its separation. As in *californica,* the male of *nocturna* has a shining mesoscutum and the scutellum lacks anterio-lateral impressions, but the eyes and ocelli are even larger, the sculpture of the sides of the thorax is very dissimilar, the size is much smaller, the color is lighter, and the pubescent hairs are appressed. The males and females of two other desert species, *depilis* and *larreae,* are also quite distinct from this new species in color, structure, and sculpture.

The easiest way to distinguish the females of *nocturna* and *californica* is by the shape of the head. The head is more elongate in *nocturna,* a little longer than broad, while it is a little broader than long in *californica* and is convex above and below in profile.

I believe the large eyes and ocelli of this species may possibly be useful in nocturnal wedding flights, hence the name.

C. mutans n. sp.

Worker

Length about 3.5 to 4.0 mm., in some colonies up to 4.5 mm.

Clypeal border in front straight, only slightly convex, or in some cases slightly concave, little produced forward beyond the level of the anterio-lateral corners of the head, giving a rather truncate appearance to the anterior border of the head. Head a little wider than long, sides only feebly convex, and hind border straight or slightly concave in large specimens, sometimes slightly convex in small specimens. Hind corners of head more angular in the larger workers than in most species. Scapes surpassing hind corners by less than one diameter in large workers, by little more than this even in smaller specimens. Thorax with the same shape and almost the same sculpture as in *californica,* the promesonotum somewhat flattened above, the mesonotal declivity indistinct, the spines only moderately divergent, straight, and of moderate length. Petiole trapezoidal, with anterior angles rounded but well produced. Postpetiole with shallow sulcus and with poorly developed hemilobes, the sides straight, and, unlike any other North American species known, narrower behind than in front. The petiole has a very large anterio-ventral tooth-like process, which arises at the front of the median ventral keel.

Mandibles, clypeus, and genae wth the usual coarse striae; those near the eyes carried past the level of the eyes. Front not especially shining but without obvious sculpture except very faint shagreening. This changes gradually to puncturation on the vertex and occiput. Thorax all distinctly punctate as in *californica,* even the declivity of the epinotum punctate in large specimens; front of pronotum and base of epinotum also with weak to strong vermiculate rugae, their strength not especially correlated with size. Large workers often have weak to moderate striae on the lower portions of the metapleura. This species also usually has the median carina of the mesonotum complete for the entire length of this sclerite, although there are many exceptions to this condition. Gaster subshining, with very weak and shallow puncturation.

Erect hairs long and flexuous but very sparse, a few hairs on the head, one on each shoulder of the pronotum or entirely absent from the thorax, the usual single posterior pair each on petiole and postpetiole, and a very few scattered hairs on the gaster. Pubescence very long and apparent, appressed or nearly so on all surfaces including scapes and legs; whitish in color rather than pale yellowish as in the female, however.

Head and thorax dark reddish brown to dark brown. Gaster very dark brown or black.

Female

Length about 8 mm.

Head, excluding mandibles, broader than long and with slightly excised or straight posterior border, wider behind than in front. Head very convex above in profile. Scapes reaching hind corners of head. Ocelli rather large, oval in shape, but not as well developed as in *californica* or *nocturna.* Frontal furrow usually weak, occasionally apparent. Head much broader than the very slender thorax, in a ratio of up to about 1.75 to 1.0, but usually about 1.5 to 1, the greatest difference of any North American species measured. Mesoscutum much longer than broad. Scutellum wider than

long. Mesoscutum in profile strongly and convexly produced in front and overhanging the pronotum. Pronotum in a few specimens with distinct longitudinal ridges on each side parallel with and near the dorsal border. Metanotum not produced. Epinotal spines longer than is usual in females, about twice as long as diameter of base. Petiole in some specimens with greatly produced anterior corners, so that the dorsal face can be over 3 times as broad as long, but in most specimens not this developed.

Mandibles striate, without smooth sulcus at base. Clypeus often with median shining streak, otherwise striate. Genal striae strong and dense, carried back past the ocelli. Rear of head finely and densely but weakly striate. Pronotum subshining, weakly striato-punctate. Mesosternal sides with strong striae and faint intercalated punctures: mesopleura mostly shining. Metapleura strongly striate below, finely striato-punctate above. Epinotal sides finely striato-punctate anterior to the spiracles, coarsely striate behind them. Base of epinotum irregularly rugose. Sides of petiole with coarse striae and fine puncturing. Postpetiole smooth above.

Pubescent hairs pigmented and extremely long and silky on all parts, giving a pale yellowish sheen to the surfaces in some lights; appressed on all parts. Erect hairs sparse but present on all regions, more numerous on the gaster, long and setae-like.

Head and thorax brown or reddish brown. Gaster dark brown.

Both the thorax and gaster of this species are slender and non-voluminous. The thorax is compressed, and the gaster is also quite slender, scarcely broader than the head and scarcely longer than the thorax. Moreover the gaster appears depressed or flattened dorsoventrally. Most North American species have the gaster considerably wider than the head, longer than the thorax, and not or scarcely depressed.

I know this new species from Morena Lake, Calif., found Aug. 3, 1957, under a rock, W. F. Buren; between Reno and Carson City Nev., under rocks, edge of desert, Aug. 9, 1957, Buren; south of Julian, Calif. on route 79, Sept. 14, 1959, under rock, Buren; Desert View Park, San Diego Co., Calif., Apr. 23, 1952, Wm. S. Creighton; and two females only from 3 mi. N. E. of Tehachapi, Calif., Aug. 11, 1935, G. D. Hanna. I have marked as the holotype a female from Morena Lake, Calif., the type locality. The other specimens have all been marked as paratypes. The holotype and a number of paratypes will be sent to the National Museum, and a number of paratypes will be sent to the Museum of Comparative Zoology and the California Academy of Sciences.

This species in the female has a very large head, and the least voluminous thorax and gaster of any North American species known to me. The habitus is thus much like a dulotic species. As temporary social parasitic species are known in the genus *Crematogaster,* the discovery of another would not be too surprising. If this new species is a temporary parasite the host must be either *californica* or *mormonum* or both, to my knowledge the only other ground nesting species occurring with any commonness in the foot-hills and lower mountains of California and western Nevada. Unfortunately, mixed incipient colonies, if they exist, have not yet been found.

The females of *mutans* can be easily separated from all other North American species by the very long, silky, yellowish, appressed pubescence, the compressed thorax, depressed gaster, and proportionately very large

head. The workers are not likely to be confused with any species except *californica* with which differentiation is rather subtile and not readily apparent at first gance. Identification confidence may be attained by noting the somewhat more square-like head shape of *mutans* with the scarcely or not at all produced clypeus, the strong anterio-ventral tooth of the petiole, usually much stronger than in *californica,* the unique shape of the postpetiole, and the appressed condition of the long pubescence on all surfaces, including scapes and legs.

C. larreae n. sp.

Worker

Length 3 to 3.6 mm., an occasional specimen up to 4.0 mm.

Head a little broader than long, with convex sides, and hind border straight or slightly concave in the center. Clypeal border evenly and gently convex. Scapes shorter than head, surpassing hind corners only slightly in larger workers, terminal third of scapes incrassated. Thorax flattened above in profile, without or with only very weakly developed mesonotal declivity. Mesoepinotal impression shallow. Pronotal humeri apparent. Weak lateral oblique pro-mesonotal impressions present.. Spines rather short, straight, and weakly divergent. Petiole trapezoidal, anterior corners moderately produced and convex. Postpetiole broader behind than in front, the hemilobes well separated by a broad median sulcus behind, but the sulcus may be very weak or almost absent in front in some specimens. In profile hemilobes produced posteriorly, weakly angulate there.

Dorsum of head shining, but with apparent shagreening which becomes weak puncturing on the occiput. Mandibles, clypeus, and genae with the usual striae, the genae more striato-punctate than is usual in most species and becoming punctate to the rear of the frontal carinae. Thorax entirely and fairly strongly punctate, subopaque; even the declivity of epinotum weakly punctate. Front of pronotum with weak vermiculate rugae. Base of epinotum with a few longitudinal striae. Sides and dorsa of petiole and postpetiole entirely punctate. Gaster with fine shagreening.

Dorsum of head, thorax, petiole, and gaster devoid of erect hairs. Only the postpetiole may sometimes have the usual posterior pair. Pubescence short and entirely appressed on all surfaces.

Head, thorax, and appendages always very dark brown as far as known. Gaster black.

Female

Length about 8.5 to 10.0 mm.

Head subsquare, as broad as long or very slightly longer than broad. Eyes and ocelli large, the ocelli turned on their sides as in several closely related species. Frontal furrow weak to moderate. Scapes failing to reach hind corners of head by appreciable distance. Thorax slender. Spines short but sharp. Petiolar anterior angles well produced. Postpetiole trapezoidal, wider in front than behind.

Major portion of head smooth; genal striae not carried past the eyes (unlike *depilis.*) Rear fourth of pronotum smooth. Rear half or third of sides of mesosterum striato-punctate. Metapleura striato-punctate. Sides of epinotum striate or striato-punctate. Base of epinotum with weak irregular rugae. Sides of petiole striato-punctate.

Hairs very sparse on dorsal surfaces, but present on head, thorax, and gaster. Venter of head with moderate number of erect flexuous hairs. Pubescence short and appressed on all surfaces.

Dark brown to black. Wing veins and stigma brown.

Male

Length about 3.0 to 3.2 mm.

Head dominated by the large, nearly hemispherical eyes and very large ocelli which greatly modify the hind border of the head; the ocelli are not greater in diameter than the interocellar distances, however. Mandibles with three weak teeth, not meeting when closed. Thorax robust, in profile the mesoscutum overhanging the pronotum. Scutellum rather evenly outlined seen from above, the anterior lateral constrictions very weak in this species. Metanotum not produced. Epinotum usually evenly rounded in profile, the spinal angles usually not at all apparent although occasionally they are noticeable.

Head shining, only shagreened. Thorax shining, the front three-fourths of the pronotum, the median part of the mesopleura, the sides of the mesosterum, the metapleura, and the sides of epinotum very weakly punctate. Otherwise the thorax is very nearly entirely smooth except for scattered piligerous punctures on the mesoscutum.

Pubescent hairs inconspicuous and appressed on nearly all surfaces; only a few pubescent suberect to erect hairs on spinal angles and erect pubescence on flexor surfaces of femora, and on front coxae. Some erect hairs present on dorsum of last few gastric segments and moderately numerous on venter of gaster.

Head and gaster black. Thorax dark brown. Only the anterior veins and stigma of the wings brownish, remaining veins colorless.

The type locality of this new species is El Paso, Tex., where it may be found commonly nesting in the lower stems and roots of the desert plant, *Larrea divaricata* Cav., growing on the compacted rocky aluvial washes surrounding the bases of the Franklin Mts. I have found *C. larreae* in numerous specimens of this plant on a number of occasions at El Paso and have taken males and females at lights in El Paso. I have also captured the species at Van Horn, Tex., 10 mi. E. of Gila Bend, Ariz., and at Yucca Grove, Calif., all of these specimens from lower stems and roots of *Larrea*. I have chosen a male taken with workers at El Paso to be the holotype and all the other specimens, including the winged forms at lights, are marked as paratypes. Dr. Wm. M. Wheeler took a few specimens of this species at Yucca, Ariz., in 1905. I have also seen specimens of this new species from Portal, Ariz. in the collection of the Southwest Research Station.

Holotype and several paratypes of each sex will be deposited in the National Musem, but I will retain most of the paratypes.

The determination of the identity of this cryptic species was of interest to me and may be related in part. I first became aware of the existance of this species in 1957 when, after summer rains, I took males and females of obviously two species of *Crematogaster* at lights several hours after sundown in the Coronado Hills residential area near the Franklin Mts. in El Paso. Searches within the next few days quickly established through captures of workers with associated winged forms that two very closely related species were present on these slopes. *C. depilis* Wheeler was found

in the lower trunks and roots of a number of desert plants, including *Acacia* sp., ocotillo, mesquite, and the creosote bush, but *C. larreae* was found only in creosote bushes. I had previously confounded the new species with *depilis* because of their extremely close resemblance in the worker form.

The captures of this species that I have made have all been associated with the creosote bush in widely ranging stations within the Chihuahuan, Sonoran, and Mohave deserts. Since this plant is perhaps the most common and characteristic bush plant of these and neighboring deserts, it might be postulated that *larreae* is equally wide ranging and common. This appears to be only partially true, for I have made searches for this ant in many localities in what appared to me to be favorable localities without success. In particular, I have been unable to find this ant at any station wthin the Colorado and Imperial deserts in spite of the commonness of the Cresote bush there. Although the factors responsible for this spotty distribution remain largely obscure, I do have at least a working hypothesis for the discontinuous dstribution of this ant near El Paso, where I have made many collections (both positive and negative for *larreae*) and observations.

The cresote bush is very abundant near El Paso, occurring on the extensive, rocky, alluvial wash slopes of the Franklin mountains as well as in the surrounding sandy deserts. *C. larreae* in the creosote bush and *C. depilis* in various other desert trees and plants are common on the rocky slopes. In spite of many intensive searches, however, I have never been able to find either of these species in the immediately surrounding sandy deserts. In this case, no very subtile factors seem to be involved, but instead a possible case of elimination by intense competition. Night observation will quickly establish that *Conomyrma bicolor* Wheeler, the predominant sandy desert dwelling species near El Paso, and several species of *Myrmecocystus,* in particular, *M. mimicus* Wheeler and *M. semirufa* Emery, are all quite active at night, leaving their nests in large numbers and foraging on the branches and leaves of the creosote bushes and other plants. Since *C. larreae* and *depilis* also forage mostly at night on these same species of plants, all these species would be in direct competition and possible conflict if exactly the same territories were occupied. Neither *Conomyrma bicolor* nor the two common *Myrmecocystus* spp. colonize in the mountain slopes, probably because of inability to construct their nests in the extremely hard and compacted rocky aluvium.

The workers of *larreae* and *depilis* Wheeler are surprisingly similar for species living in such close proximity. About the only character which will easily separate them is color, the head and thorax of *depilis* being reddish, while *larreae* is more concolorously very dark brown to black. Taxonomic distinction must fall on the structures of the females and males, especially the latter. The females of *depilis* have the entire pronotum punctate. The head is distnctly broader than long. The frontal furrow is strong and distinct to the first ocellus. The genae are striate to past the eyes; and the base of the epinotum has strong rugae or longitudinal striae. The color is usually a very dark concolorous reddish brown.

The males of the two species differ markedly. First there is a marked size range difference. All of the males of *depilis* measure 5.5 to 6.0 mm. The head is entirely punctate in *depilis* as is the pronotum. The spinal angles

are often apparent in *depilis* and are always delimited by a tuft of long, flexuous pubescent hair. The coxae, femora, petiole, and postpetiole are also clothed with long erect pubescence. The pubescence is also erect and long on the venter of the head and suberect on hind corners of the head; the thorax has suberect to erect pubescence on nearly all surfaces. The vertex with its ocelli does not usually interrupt and distort the hind border of the head in full face view in *depilis* as it does in *larreae*.

C. opuntiae n. sp.

Worker

Length about 3.5 to 4.5 mm.

Head broader than long, with quite convex sides and rounded hind corners. Hind border nearly straight, slightly convex in small workers and slightly excised in large workers. Clypeal border gently convex. The head is usually noticeably narrower behind the eyes than in front, especially in medium sized and small specimens. Scapes evenly incrassated to tips, surpassing the hind corners of head by about one diameter even in large sized specimens. In smaller specimens the scapes may be a little longer, proportionately. Thorax flattened above in profile as is usual in this group of species, and with the mesonotal declivity short, poorly differentiated, or absent. Humeri not strongly developed, but nearly always distinct. Spines of moderate length, slender, sharp, and divergent. In some specimens, the spines may be outwardly curved at tip. Petiole of usual trapezoidal shape, the anterior corners moderately well developed and the anterior borders, as seen from above, usually not produced at right angles to the pedicel, but slightly to moderately oblique. Postpetiole with flattened hemilobes, the sides straight and subparallel or very slightly widening to the rear. Median sulcus of the postpetiole shallow in front, widening and deepening to the rear. In profile the hemilobes are somewhat produced posteriorly and are semi-angulate behind. The petiole sometimes has a distinct anterio-ventral tooth developed on the front of the ventral keel.

Mandible, clypeus, and genae with the usual striae, those on the genae distinct only slightly past the eyes, sometimes fading out at about the middle of the eyes. Rest of head shining, and with only the very weak sculpturing of fine shagreening which becomes very faint puncturing on the vertex and occiput. Thorax strongly and densely punctate on nearly all its surfaces, even the declivity of epinotum faintly punctate in some specimens. There are also some distinct vermiculate rugae on the front of the pronotum and base of epinotum. Petiole and postpetiole very finely and densely punctate. Gaster finely shagreened, shining.

Erect hairs very few or nearly entirely absent on dorsum of head (excluding the usual anterior row of bristles on the clypeus.) On the thorax only a single erect hair on each pronotal shoulder. On petiole and postpetiole, the usual posterior pairs of hairs only. On gaster, a very few scattered erect hairs and sparse rows of hairs at posterior borders of the tergites. Pubescence rather short and appressed or nearly so on all surfaces, including scapes and legs. The length of the pubescent hairs in relation to those of *californica* on the gaster can be assayed by noting that in *opuntiae* these fine hairs are usually not long enough to overlap those arising caudad.

Colors variable, especially in preserved material. The head and thorax may be reddish brown to black. Often the head is darker than the thorax. In life, foraging workers on cactus (*Opuntia* sp.) are usually quite dark and more nearly concolorous.

I have chosen a worker collected in the Santa Rita Experimental Range, near Continental, Ariz. to be the holotype, and this locality becomes the type locality. The species is very common within its rather circumscribed range within the Sonoran desert in Ariz., and surrounding semi-desert, but apparently reaches little into New Mexico, and to the south, in the Sonoran desert of Mexico, is replaced entirely in the cholla cactus areas by *dentinodis* Forel. To the west, I have never been able to find the species beyond Ajo and Gila Bend, Ariz. Northward, insufficient sampling at present will not allow assessment of the limits of the range of *opuntiae* but I would expect it to occur only rarely beyond the limits of the Sonoran desert.

This new species can be found most easily by searching for foraging workers on various cholla cactus species. Probably the chain fruit cholla, *Opuntia fulgida,* is the most frequented but there is no specificity to this plant. The species is known to me from the following localities and specimens from these have been marked as paratypes: Santa Rita Experimental Range, E. of Continental, Ariz., several series, W. F. Buren; on route 89 in New Mexico close to Arizona border, Buren; 10 mi. E. of Benson, Ariz., Buren; in Texas Canyon E. of Benson, Ariz., Buren; 50 mi. E. of Ajo, Ariz. on Ajo Road, Buren; Saguaro National Monument, E. of Tucson, Ariz., Buren; Sill, Ariz., Buren; 5 mi. S. of Oracle Junction, Ariz., Wm. S. Creighton; near Papago Reservation Boundary on Ajo Road, Ariz., Buren; Portal, Ariz., Creighton and Buren; 30 mi. N. of Tucson, Buren; 15 mi. E. of Globe, Ariz., Buren; Organ Pipe Nat. Mon., Buren; Abra Wash, Organ Pipe Nat. Mon., Creighton; Benson, Ariz., W. M. Wheeler; and Tucson, Ariz., W. M. Wheeler.

This species is very similar to *californica,* differing mainly in its shorter pubescence which is entirely appressed on head and scapes. The sculpturing, especially on the hind portions of the head, is weaker, and the colors are nearly always dark in life. *C. californica* is never associated with cactus so far as I have been able to determine. Since the two forms differ in both ecology and morphology, and their ranges seem to be separated by an impenetrable barrier, I have chosen to regard them as distinct species.

Literature Cited

Buren, W. F. 1958. A review of the species of *Crematogaster, sensu stricto,* in North America (Hymenoptera: Formicidae) Part I. Jour. New York Ent. Soc. 66, pp. 118-134.

Creighton, W. S. 1950. The Ants of North America. Bull. Mus. Comp. Zool. Harv., 104: 1-585.